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DEPT. OF HEALTH AND HUMAN SERVICES

Development of a Statewide and Regional Antibiogram Report

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Background

Antibiograms summarizing local pathogen susceptibilities are essential tools for clinicians and public health professionals, guiding empiric antibiotic therapy before culture results are available and supporting antibiotic stewardship efforts.

The Nebraska DHHS Healthcare-Associated Infections and Antimicrobial Resistance (HAI/AR) Program compiled a statewide and regional Gram-negative antibiogram report.

The goal was to produce a resource that local health departments (LHD), healthcare facilities and clinicians can use to compare resistance trends across jurisdictions.

Methods

Susceptibility data on 46,065 Gram-negative bacterial isolates from inpatient and outpatient settings extracted from Nebraska's Electronic Disease Surveillance System.

In accordance with Clinical & Laboratory Standards Institute recommendations, only the first isolate per patient per organism from all specimen sources was included.

Data analyzed using SAS version 9.4.

Susceptibility results were aggregated by organism-antibiotic combination and by state and LHD jurisdiction.

Report added to the HAI/AR program website and distributed to stakeholders including LHDs, hospitals, long-term care facilities, and members of the HAI/AR advisory council.

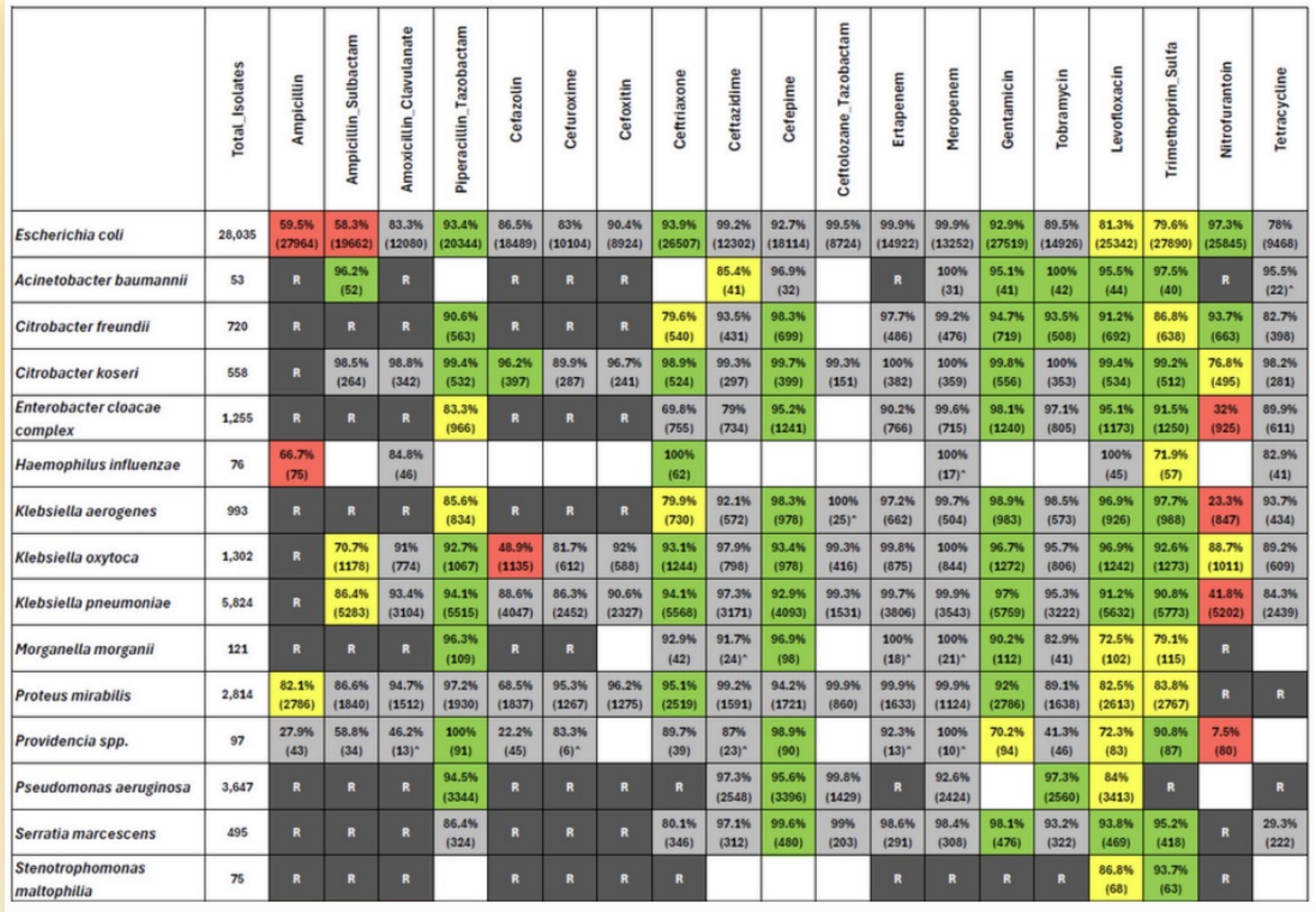
Results

To begin the report, the statewide antibiogram, followed by antibiograms for 18 LHDs are displayed.

If susceptibility results missing for >30% of isolates, results are gray indicating uncertainty in interpretation.

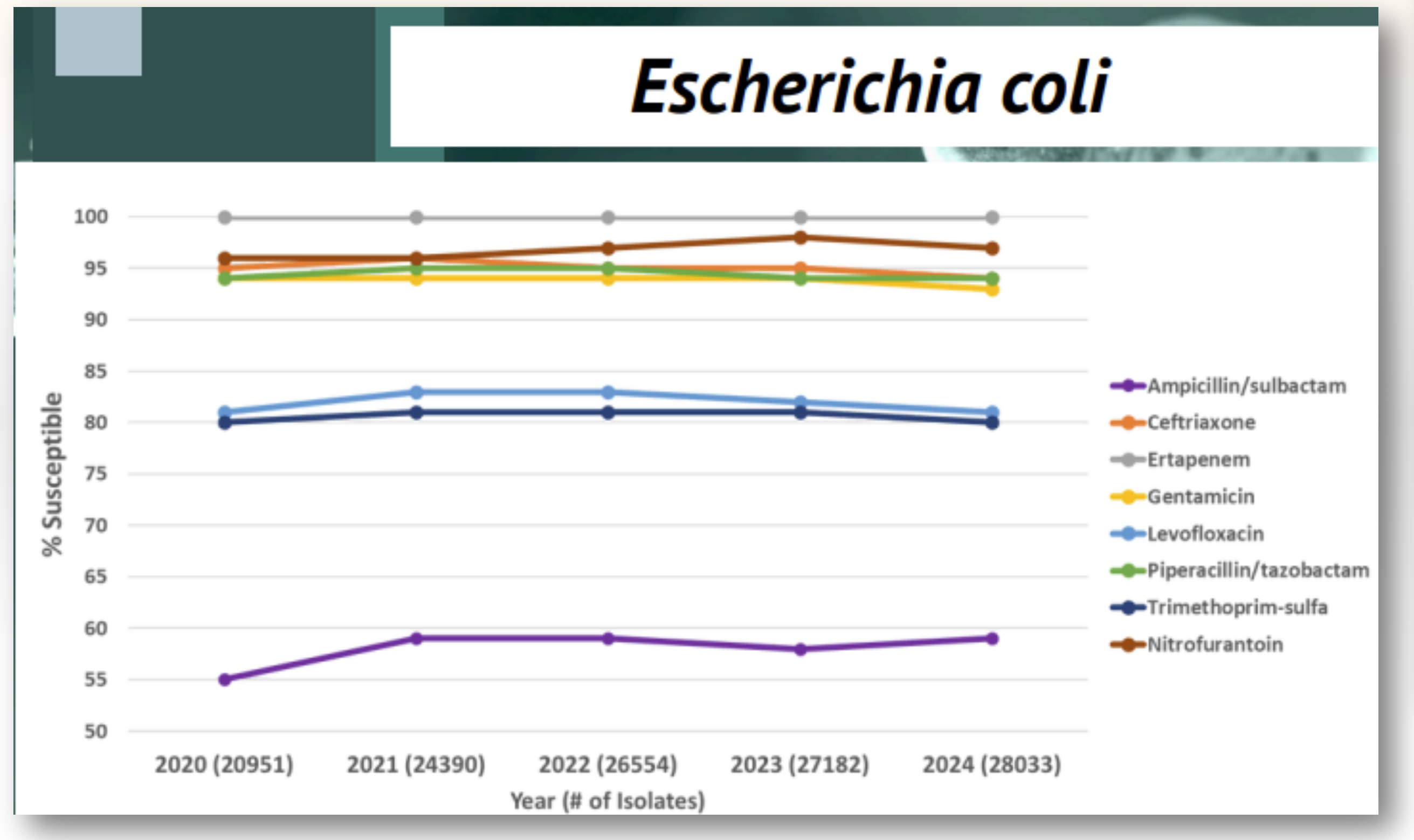
Organism-antibiotic combinations with >90% susceptibility displayed in green, 70-89% in yellow, and <70% in red.

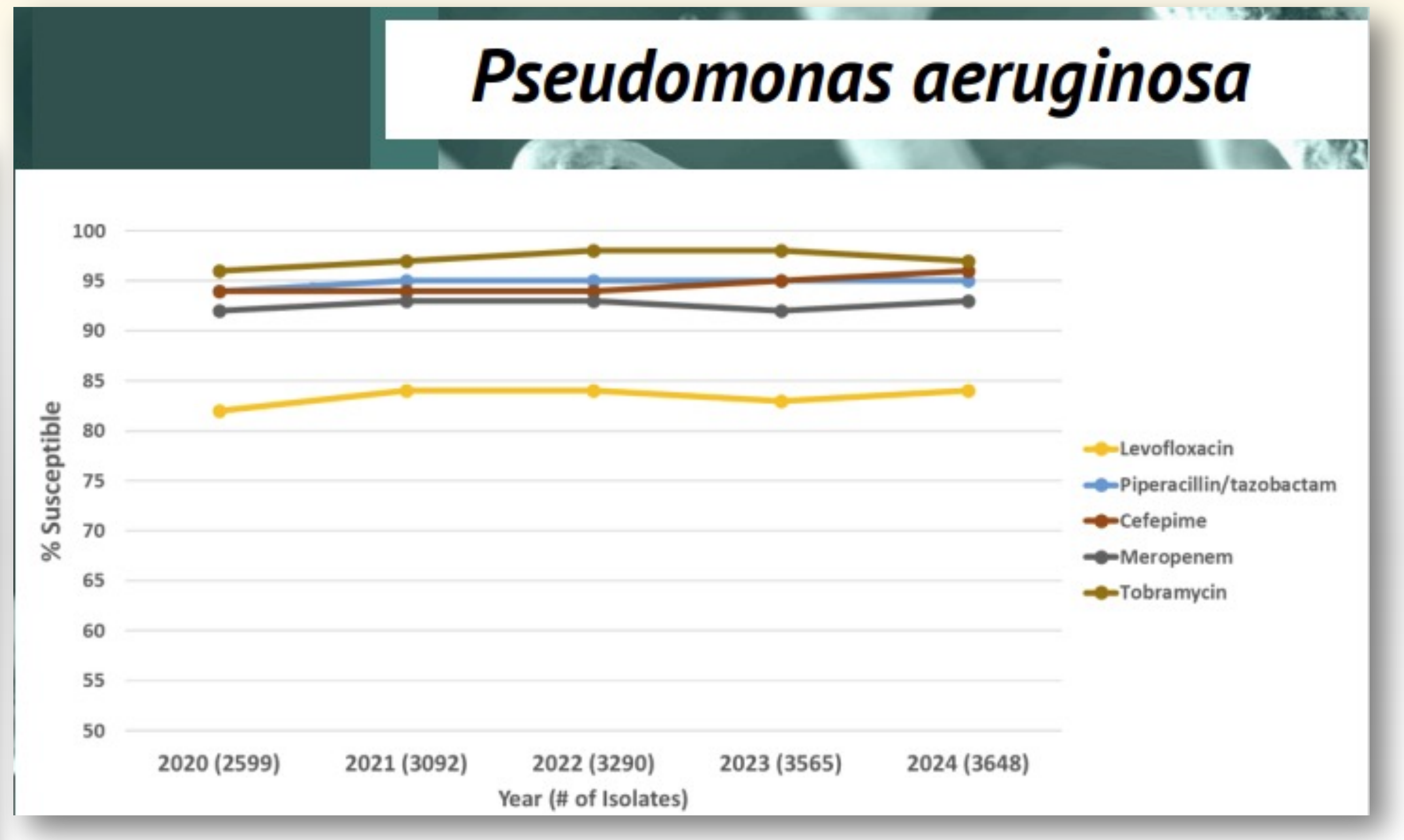
Most frequent Gram-negative organisms: *Escherichia coli* (28,035, 61%), *Klebsiella pneumoniae* (5,824, 13%), *Pseudomonas aeruginosa* (3,647, 8%).



	Total_Isolates	Ampicillin	Ampicillin_Sulbactam	Amoxicillin_Clavulanate	Piperacillin_Tazobactam	Cefazolin	Cefuroxime	Cefoxitin	Ceftriaxone	Ceftazidime	Cefepime	Ceftolozane_Tazobactam	Ertapenem	Meropenem	Gentamicin	Tobramycin	Levofloxacin	Trimethoprim_Sulfa	Nitrofurantoin	Tetracycline
Escherichia coli	28,035	59.5% (27964)	58.3% (19662)	83.3% (12080)	93.4% (20344)	86.5% (18489)	83% (10104)	90.4% (8924)	93.9% (26507)	99.2% (12302)	92.7% (18114)	99.5% (8724)	99.9% (14922)	99.9% (13252)	92.9% (27519)	89.5% (14926)	81.3% (25342)	79.6% (27890)	97.3% (25845)	78% (9468)
Acinetobacter baumannii	53	R	96.2% (52)	R		R	R	R		85.4% (41)	96.9% (32)		R	100% (31)	95.1% (41)	100% (42)	95.5% (44)	97.5% (40)	R	95.5% (22)^
Citrobacter freundii	720	R	R	R	90.6% (563)	R	R	R	79.6% (540)	93.5% (431)	98.3% (699)		97.7% (486)	99.2% (476)	94.7% (719)	93.5% (508)	91.2% (692)	86.8% (638)	93.7% (663)	82.7% (398)
Citrobacter koseri	558	R	98.5% (264)	98.8% (342)	99.4% (532)	96.2% (397)	89.9% (287)	96.7% (241)	98.9% (524)	99.3% (297)	99.7% (399)	99.3% (151)	100% (382)	100% (359)	99.8% (556)	100% (353)	99.4% (534)	99.2% (512)	76.8% (495)	98.2% (281)
Enterobacter cloacae complex	1,255	R	R	R	83.3% (966)	R	R	R	69.8% (755)	79% (734)	95.2% (1241)		90.2% (766)	99.6% (715)	98.1% (1240)	97.1% (805)	95.1% (1173)	91.5% (1250)	32% (925)	89.9% (611)
Haemophilus influenzae	76	66.7% (75)		84.8% (46)					100% (62)					100% (17)^			100% (45)	71.9% (57)		82.9% (41)
Klebsiella aerogenes	993	R	R	R	85.6% (834)	R	R	R	79.9% (730)	92.1% (572)	98.3% (978)	100% (25)^	97.2% (662)	99.7% (504)	98.9% (983)	98.5% (573)	96.9% (926)	97.7% (988)	23.3% (847)	93.7% (434)
Klebsiella oxytoca	1,302	R	70.7% (1178)	91% (774)	92.7% (1067)	48.9% (1135)	81.7% (612)	92% (588)	93.1% (1244)	97.9% (798)	93.4% (978)	99.3% (416)	99.8% (875)	100% (844)	96.7% (1272)	95.7% (806)	96.9% (1242)	92.6% (1273)	88.7% (1011)	89.2% (609)
Klebsiella pneumoniae	5,824	R	86.4% (5283)	93.4% (3104)	94.1% (5515)	88.6% (4047)	86.3% (2452)	90.6% (2327)	94.1% (5568)	97.3% (3171)	92.9% (4093)	99.3% (1531)	99.7% (3806)	99.9% (3543)	97% (5759)	95.3% (3222)	91.2% (5632)	90.8% (5773)	41.8% (5202)	84.3% (2439)
Morganella morganii	121	R	R	R	96.3% (109)	R	R		92.9% (42)	91.7% (24)^	96.9% (98)		100% (18)^	100% (21)^	90.2% (112)	82.9% (41)	72.5% (102)	79.1% (115)	R	
Proteus mirabilis	2,814	82.1% (2786)	86.6% (1840)	94.7% (1512)	97.2% (1930)	68.5% (1837)	95.3% (1267)	96.2% (1275)	95.1% (2519)	99.2% (1591)	94.2% (1721)	99.9% (860)	99.9% (1633)	99.9% (1124)	92% (2786)	89.1% (1638)	82.5% (2613)	83.8% (2767)	R	R
Providencia spp.	97	27.9% (43)	58.8% (34)	46.2% (13)^	100% (91)	22.2% (45)	83.3% (6)^		89.7% (39)	87% (23)^	98.9% (90)		92.3% (13)^	100% (10)^	70.2% (94)	41.3% (46)	72.3% (83)	90.8% (87)	7.5% (80)	
Pseudomonas aeruginosa	3,647	R	R	R	94.5% (3344)	R	R	R	R	97.3% (2548)	95.6% (3396)	99.8% (1429)	R	92.6% (2424)		97.3% (2560)	84% (3413)	R		R
Serratia marcescens	495	R	R	R	86.4% (324)	R	R	R	80.1% (346)	97.1% (312)	99.6% (480)	99% (203)	98.6% (291)	98.4% (308)	98.1% (476)	93.2% (322)	93.8% (469)	95.2% (418)	R	29.3% (222)
Stenotrophomonas maltophilia	75	R	R	R		R	R	R	R				R	R	R	R	86.8% (68)	93.7% (63)	R	

Statewide resistance trends show that antibiotic susceptibility for six of the most common organisms remained stable from 2020-2024.

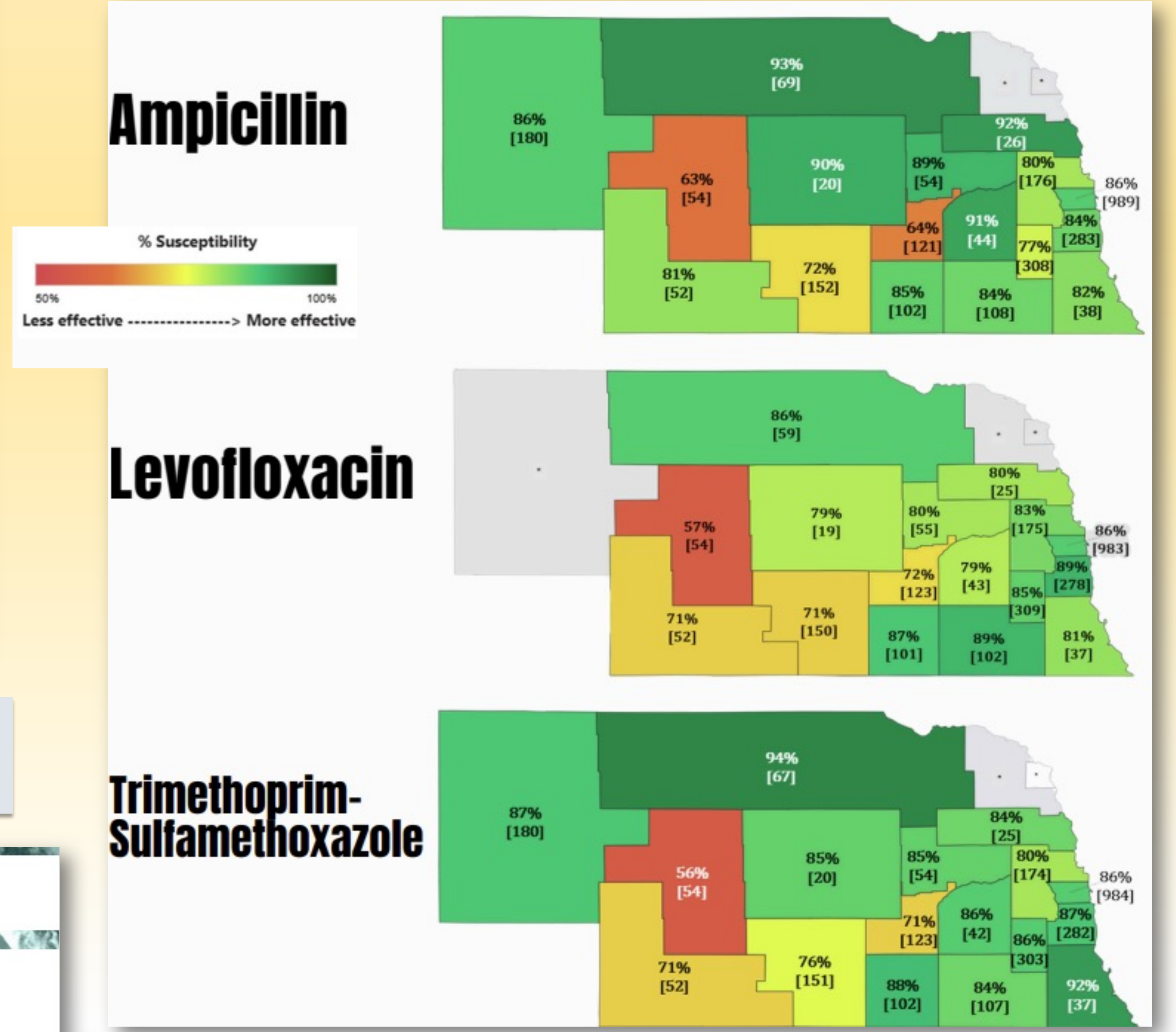




Notably, *Pseudomonas aeruginosa* susceptibility remained over 90% throughout 2020-2024 for most antibiotics.

Next in the report, heatmaps by LHD highlight noticeable variations in antibiotic susceptibility

(e.g., *Proteus mirabilis* susceptibility to trimethoprim-sulfamethoxazole ranged from 56-94%, seen below)



View the Antibiogram report Here!

Conclusions

By summarizing statewide and regional resistance data, we identified clinically meaningful regional differences in susceptibility. This report provides an accessible, data-driven tool to support antibiotic stewardship and monitor antibiotic resistance in Nebraska, which is particularly important in rural areas with limited capacity to develop a local antibiogram due to small numbers of isolates and send out microbiology laboratories.

The Nebraska HAI/AR Program plans to update this report annually. The report can be used by clinicians and public health to:

- **Use in conjunction with other surveillance (e.g., NHSN, case reports, tracked antibiotic use data)**
- **Track year-over-year trends to identify shifts in resistance**
- **Collaborate with local antibiotic stewardship partners to understand facility-specific trends**
- **Advocate for more comprehensive data contributions from microbiology laboratories**

Acknowledgements

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